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positive lenses, other things being equal, and in Mr. Franklin-Adams's 10-inch lens is actually about ·39 inch. The adjustments of a large lens of this type are necessarily of a very delicate nature, and means are provided both for tilting the negative lens in any direction with respect to the optic axis and also for moving it laterally in any direction parallel to itself. Perfect symmetry of field is thus more at command, and after that has been satisfactorily secured the negative lens is carefully fixed in position.

The actual photographs taken and exhibited by Mr. Franklin-Adams will sufficiently show the capabilities of the lens for stellar photography in cases where large regions of the sky are required to be depicted in one view.

1903 *July* 10.

Description of the Mount. By Alfred Taylor.

The mounting was designed to utilise two existing cameras with lenses of unequal sizes and focal lengths. Both cameras having to be in use at the same time, the results from one serving as a check on the other, perfect parallelism and sympathy of motion are of great importance. Rigidity in the mounting, with great ease of working, had therefore to be carefully kept in view in its construction.

The mounting is of the English type, there being no central pillar to interfere with a complete twelve hours' run for all positions of the telescope. This is an important factor where star photography is concerned. The polar axis consists of a cross-braced steel frame, square in section, the width at the middle being determined by a suitable spread of bearings to give length to the declination axis. Both ends of the polar axis run in double ball bearings, mounted in swivelling frames, which take the side thrust due to the inclination of the axis, while another ring of balls at the lower end takes the end thrust there. The swivelling frames much reduce the difficulty of adjusting the polar axis, and the risk of friction from error in alignment there would be with plain bearings. Ball bearings have been successfully adopted by T. Cooke & Sons for some time on equatorial mountings carrying telescopes anything over 6 inches in diameter, the reduction of friction and consequent ease of movement greatly conducing to regularity in running, the work required to be overcome by the driving clock being more uniform and considerably less than with plain bearings.

The hour-circle, tangent wheels for both axes, and declination circle are all of gun-metal.

The R.A. tangent wheel is 43 inches diameter, and has 1080 teeth. It is loose on its axis and can be clamped by a screw worked by bevel wheels and loose cords led conveniently near to the eye-ends of the guiding telescopes.

The hour-circle is 24 inches diameter, both edges divided on

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silver to minutes of time, with fixed and movable verniers reading to two seconds of time.

It being Mr. Franklin-Adams's intention to do work in both hemispheres, the hour-circle and verniers have been figured to read both ways round, one set of the engraved figures being filled in with red wax for the southern hemisphere, and the other in black for the northern hemisphere.

The driving clock is by Messrs. Repsold, of Hamburg, and will run $2\frac{1}{2}$ hours without rewinding.

The spindle which communicates the motion of the clock to the mounting makes thirty revolutions in one minute. At the top end of this spindle a worm engages with a small wheel on the tangent shaft, so that between the clock and the large tangent wheel the number of driving wheels is kept small—a matter of some importance where accuracy of drive is concerned.

The slow motion consists of a train of mouse gear, driven by a small reversible electric motor, which can run up to 3,000 revolutions per minute. The slow motion is unlimited, *i.e.* the telescope can be run through a complete circle by means of the motor if desired.

The socket for the declination axis is of cast iron bushed at the ends with gun-metal and formed with large square flanges bolted to two sides of the polar axis frame. The length across the bearings is 3 feet.

The axis is also of cast iron and hollow. The end flanges carry the two cameras and brackets for the two guiding telescopes. These brackets have specially large flanges, which allow the guiders to be temporarily set 10° out of parallelism to view any corner of the rectangular field covered by the cameras. Each guider has a 6-inch achromatic object-glass of 6 feet focal length. The eye-end has a sliding stage allowing a rough circular movement of $\frac{5}{8}$ inch, and a sub-stage with a fine adjustment of $\frac{1}{10}$ inch, such as is used with microscopes.

The declination circle is fixed to the side of the polar axis frame. It is 2 feet 6 inches diameter, divided on silver to 5 minutes of arc, and reading by verniers (which turn with the cameras) to 10 seconds of arc. One of the verniers is read from alongside the eye-end of the adjoining guider by a telescope with a diagonal eyepiece, which can be turned in any convenient direction. The rim of the declination circle is divided and engraved with large figures for rough setting without using the reading microscope. The slow motion in declination is effected by means of a mouse feed gear, driven by a reversible electric motor—similar to that for the R.A. slow motion—driving a worm which works into a complete wheel. This gives an unlimited range to the slow motion and avoids the annoyance caused by coming to the end of the motion when the amount is limited. The driving wheel is 27 inch pitch diameter, and has 1,080 teeth. It is loose on the axis and may be clamped from the eye-end of the guider alongside.

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Starting and reversing switches hang from near the eye-ends of both guiders, and the slow motions in both R.A. and declination are from thence under easy control.

The guiding telescopes have light and dark field electric illuminations to the cross wires, the leads for these and for the slow-motion motors passing up through the centre of the declination axis and down the guiders to the switches, the usual outside festoons of electric wires, and the consequent risk of their breakage, being thereby avoided.

The upper and lower end brackets for the polar axis will be supported on concrete, or stone, and brick piers.

The telescope will be erected in a wood shed 12 feet 6 inches wide × 20 feet 6 inches long, both inside measurement, resting on a brick foundation raised a little above the ground. The ridged roof is in two parts, each with four rollers, running on rails laid upon the upper side beams of the house. These beams are continued 10 feet beyond each end of the house; the two halves of the roof run along these, and thus allow a clear overhead view for the instrument; or by both halves being drawn to one end of the house, a clear view may be obtained at the other end down to the horizon.

The sides and roof are covered with Willesden 4 ply waterproof paper.

The total weight of the mounting with cameras is about $2\frac{3}{4}$ tons, 100 lb. being the weight of the 10 in. lens.

On the New Greenwich Micrometer for measurement of Photographs of Eros.

(*Communicated by the Astronomer Royal.*)

The photographs of *Eros* taken for the determination of the solar parallax need to be measured with greater refinement than was necessary for the astrographic plates. A new micrometer was accordingly obtained from Messrs. Troughton and Simms early in 1903 in which the principle adopted by Mr. Hinks in the Cambridge micrometer (*Monthly Notices*, lxi. p. 444) of a divided glass scale in the focal plane moved by micrometer screws was employed. The new features in the Greenwich micrometer are (i) the microscope, which is arranged so that it can be used to give magnification 2 or 1, so as to adapt it to photographs taken either with the Astrographic telescope, focal length 11 ft. 3 in. (3·40 metres), or with the Thompson refractor, focal length 22 ft. 6 in. (6·80 metres); (ii) the glass scale is ruled with pairs of lines so spaced as to admit of very accurate pointing on the réseau line placed between them.

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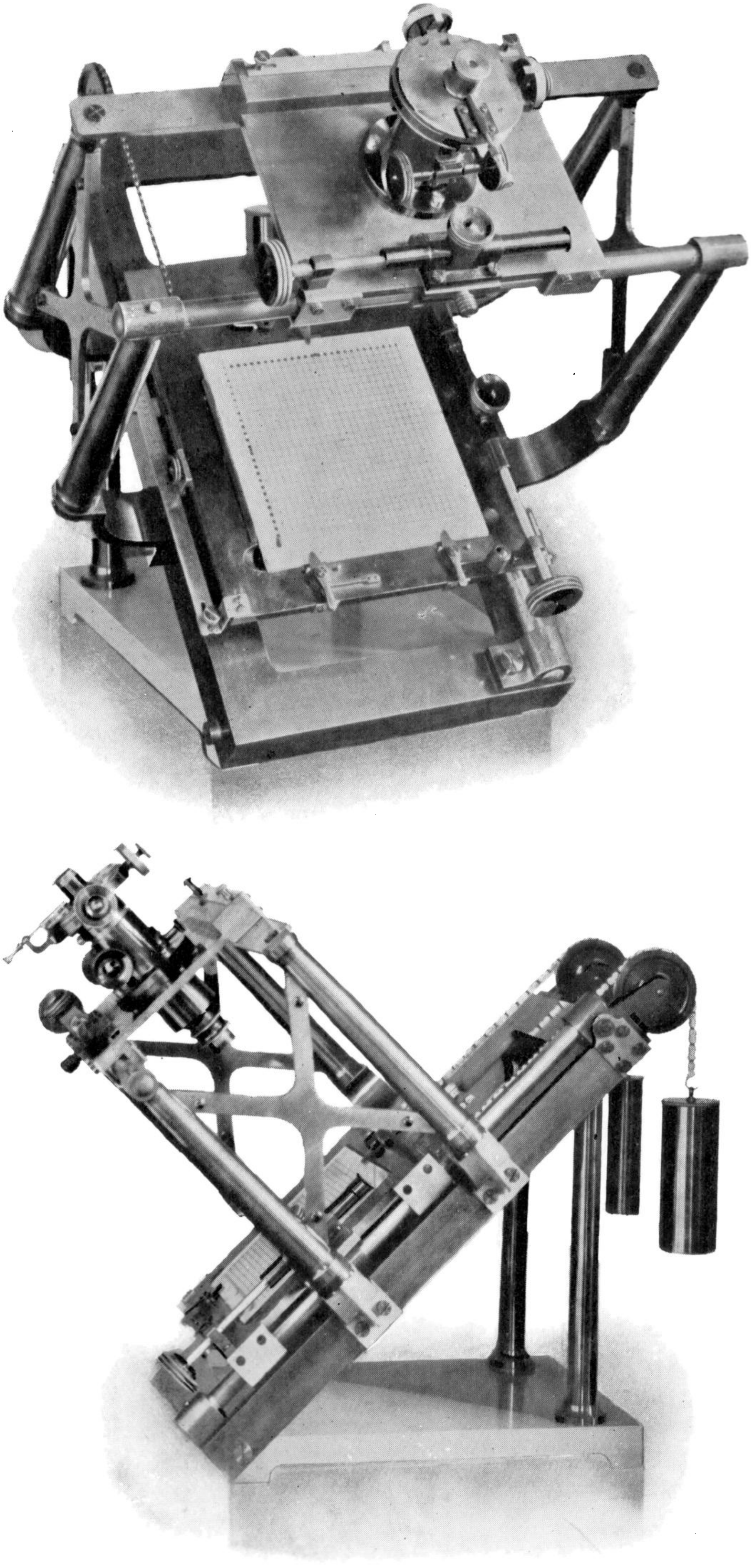
MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY. VOL. LXIV. PLATE 15.



ROYAL OBSERVATORY, GREENWICH,

NEW MICROMETER FOR MEASUREMENT OF PHOTOGRAPHS OF EROS.